RESEARCH IMPLEMENTATION REPORT

ARIZONA TRANSPORTATION RESEARCH CENTER

MARCH 2004

Arizona Department of Transportation

Welcome

The Arizona Transportation Research Center is charged with directing the Arizona Department of Transportation (ADOT) research program. An integral part of a successful research program is implementation of research results. This report highlights research implementation from calendar year 2003.

The ADOT research program is focused on applied transportation research. As such, the principal measure of its success is the extent to which research results are carried out. Implementation of research can take many forms, from assisting decision-makers to improved methods, materials and practices. Research implemented during 2003 included completion of a hazardous materials inventory which assisted in preparation of a Pollution Prevention Plan, development of transportation congestion management strategies, and use of a new integrated data management system.

Some research implementation had direct financial benefits. A study on the aging driver population helped ADOT secure grant funding in the amount of $91,950 to study this issue in detail with the intent of making roadways safer for older drivers. The study on the use of third parties to conduct some Motor Vehicle Division transactions demonstrated that this results in significant savings to ADOT. This is critical information when deciding whether to continue or expand this program.

To gain the greatest value from the research performed it's important to evaluate and learn from the results of the research. This maximizes the benefits of completed research and improves the selection and design of future research efforts.

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About the Arizona Transportation Research Center

The Arizona Department of Transportation (ADOT) conducts research on a wide range of transportation topics. The Department's research effort is administered by the Arizona Transportation Research Center (ATRC), which has immediate responsibility for the management and conduct of research. During 2003 the ATRC research program was guided by two internal Research Councils that provide direction on research priorities, and a research Steering Committee. The Steering Committee provides policy guidance for the total research effort.

The Arizona Transportation Research Center is located at 2739 East Washington Street, Phoenix, Arizona. A list of ATRC staff is shown in Table 1.

TABLE 1 – ATRC STAFF

Frank T. Darmiento, P.E. – Manager & Product Evaluation (PRIDE) Program
Rosendo Gutierrez, P.E. – Research Project Manager
Estomih (Tom) Kombe, Ph.D., P.E. – Research Project Manager
Steve Owen, P.E. – Research Project Manager
Nick Samuelson – PRIDE Program Engineering Assistant
Larry Scofield, P.E. – Research Project Manager
John Semmens – Research Project Manager
Dale Steele – Librarian
Nate (Nathanael) Woolfenden – Field Technician

ATRC manages the ADOT transportation research program, including conducting in-house research, coordinates the ADOT product evaluation program, houses and operates the ATRC Library, and provides direct financial support for ADOT's Local Technical Assistance Program (LTAP).

Each year ATRC solicits research proposals throughout ADOT and the transportation community. In meetings with individual offices or in Department-wide needs assessment meetings, ADOT personnel are asked to suggest research pertinent to their

areas. ATRC also invites suggestions from academia, consultants, and industry. Research suggestions are solicited through personal contact, newsletters, electronic communications, and the Internet.

The ATRC research program is currently grouped into seven emphasis areas. These areas are:

- Environment
- Intelligent Transportation Systems
- Maintenance
- Materials and Construction
- Planning, Administration, Motor Vehicles, and Information Technology
- Structures
- Traffic and Safety

New projects are assigned to one of these areas. A project manager is assigned to each project. Technical advisory committees are formed for each project to work with the project manager on developing work scopes, reviewing and guiding the progress of the research, and reviewing the final report.

Student Research Outreach

The ATRC research program incorporates the use university students wherever possible. Each year ATRC allocates up to $100,000 for small budget projects ($15,000 or less) that often provide opportunities to contract university students for transportation research. ATRC enthusiastically encourages future transportation professionals and offers students the opportunity to learn first hand about the role of research and technology in the Nation's transportation system, and the variety of available transportation career options. The results have been high quality research that makes effective use of the ATRC research budget while providing valuable professional experience for students.

Research Implementation

During calendar year 2003, 12 research projects were completed under ATRC management. (Appendix A includes a list of these projects.) All these projects are examples of applied research. As such, implementation of the research results is the ultimate measure of the success of the research.

Implementation may range from assisting an entity in making a decision, to a change in operational strategies or activities. The results of the *Hazardous Materials Inventory Status and Action Plan for ADOT* (SPR-509) research assisted ADOT in complying with environmental laws at a cost of under $30,000. Penalties for violating these laws could extend to hundreds of thousands of dollars. The results of the $12,898 study, *Highway Facilities for an Aging Arizona Population* (SPR-486), enabled ADOT to secure a grant of nearly $92,000 to study this problem in depth.

This report highlights some of the key research implementation activities that occurred during 2003. The discussion is grouped by research emphasis area.

Knowledge is not achieved until shared.

ENVIRONMENT

SPR-509, *Hazardous Materials Inventory Status and Action Plan for ADOT*

Project Cost: $29,575

Summary: In order to comply with regulatory requirements ADOT needed to develop an internal statewide inventory of hazardous materials quantities used, purpose, and disposal methods. Results of the inventory were intended to form the basis for a "Pollution Prevention Plan" (P3) to limit unnecessary hazardous materials use, and to train employees in finding and using less hazardous alternatives.

Implementation: ADOT has completed and submitted a Pollution Prevention Plan. The inventory indicated that ADOT reached the threshold requiring compliance with this requirement. The Plan was developed as part of the research effort. The documentation gathered in this study provides a framework for future development of the similar evaluations and plans, and further exploration of the subject. This year the Environmental and Enhancement Group will use the same framework to satisfy the statutory documentation requirements.

INTELLIGENT TRANSPORTATION SYSTEMS

SPR-542, *Congestion Management Strategies*

Project Cost: $100,000

Summary: The project developed an ADOT database of congestion measurements and mitigation tools, which will be very significant if and when implemented. This was an ADOT Core Team (Executive Management) urgent project to identify appropriate congestion measures for rural and urban highways in Arizona. The effort involved a team of consultants and university research groups, including the Texas Transportation Institute. The team determined a unique Arizona approach based on ADOT's Intelligent Transportation Systems (ITS) infrastructure and related resources to monitor traffic flow in rural areas. They developed a Microsoft Access database of approximately one hundred congestion mitigation strategies deemed valid and of value for rural and/or urban Arizona conditions.

Implementation: The database was assigned by the Core Team to the Transportation Planning Division (TPD). While not implemented immediately on a stand-alone basis, it is a resource in use by TPD and its consultants on long-range planning activities since late 2002.

PLANNING AND ADMINISTRATION

SPR-486, *Highway Facilities for an Aging Arizona Population*

Project Cost: $12,898

Summary: This research aimed at facilitating measures to improve highways for older drivers. Data was gathered on elderly users of highway facilities in order to ascertain their special needs and determine the extent to which these needs are currently being met. Increased life expectancies combined with declining birthrates mean that people over 65 years of age will comprise larger proportions of the population. In Arizona, over 99% of personal travel is made in owner-operated automobiles.

Implementation: The immediate outcome of this research was Arizona's successful competition for a federal grant to set up a demonstration project on US 60 near Sun City to study this issue in detail. The grant amount is $91,950 ($73,560 in Federal and $18,390 State funding). In the long run the improvements made to better accommodate older drivers are expected to reduce the frequency of crashes. This will save money and lives. Each future fatality avoided saves over a million dollars, each incapacitating injury crash avoided saves over $50,000, each non-incapacitating injury crash avoided saves over $17,000, each possible injury crash avoided saves nearly $10,000 and each property damage-only crash avoided saves over $6,000.

SPR-515, *Program and Project Financial Management Needs Assessment*

Project Cost: $139,978

Summary: The ADOT accounting software does not report all construction-related costs budgeted in the Five-Year Highway Construction Program for the current fiscal year. Therefore there is not a direct correlation between the Highway Construction Program budgeted and the related costs of the Program. The research evaluated ways to review project costs on a regular basis to determine the appropriateness of costs being charged to those projects and estimated costs to complete for the purpose of requesting additional budget, if needed. The research also looked at ways to add construction contract change orders to the Contract Accounting system.

Implementation: A total of 78 recommendations were identified and documented from focus group meetings, executive interviews, and the responses to the ADOT internal survey. The requirements for the financial improvements, those that have a direct impact on improving project budgeting and accounting

processes and systems were identified. Financial improvement projects and phases were developed to address related groups of requirements.

During the process of identifying requirements the contractor determined that ADOT's financial system (ADVANTAGE) meets many of ADOT's financial reporting needs. Requirements identified for project budgeting, accounting, and reporting would not necessarily be fully met by implementing a replacement system. In addition, implementing a new financial and project accounting system or even upgrading the current ADVANTAGE system is viewed as cost prohibitive. Future implementation may focus on financial improvements that can be implemented by enhancing the current system.

SPR-517, *Evaluation of Integrated Document Management System (IDMS) Options for ADOT*

Project Cost: $100,000

Summary: This research was aimed at improving ADOT document retrieval and management. The objective of the research was to evaluate the concept of an Integrated Document Management System (IDMS). The IDMS would bring together the various document types in a software solution that would make corporate information accessible *via* ADOT's Intranet. It would be a comprehensive solution to managing all documents for both enterprise and line-of-business applications.

Implementation: Based on the analysis and research into the IDMS deployments at ADOT it was recommended that IDMS implementation proceed in the application areas with highest impact, visibility, and need for the IDMS solutions. The ADOT Bridge Group already has implemented a document management system. The Motor Vehicle Division is now taking steps toward implementing a similar system.

SPR-539, *Third Party Transaction Cost-Benefit Analysis*

Project Cost: $25,000

Summary: Third parties are private or public entities authorized by the Motor Vehicle Division (MVD) to provide services to the public that otherwise would be done in a Motor Vehicle Division field office. These services include motor vehicle title and registration transactions, driver license testing and application processing, and vehicle identification number verification inspections on out-of-state vehicles transferring to Arizona. The research quantified the benefits and cost savings of third parties in offloading work and expense from MVD.

Implementation: The research showed that the cost per transaction for MVD Customer Service is $10.66 versus $9.54 for Third Party (a savings of over $2.1 million per year). In addition to the cost savings of the Third Party Program, the Program provides a number of significant intangible benefits, such as: reduced wait times in existing Customer Service offices, more convenient hours and days of service availability, reduced customer travel time and improved customer goodwill, reduced need for new buildings, MVD staff, and equipment, improved image of MVD responsiveness, process improvement, and demonstrated success of e-government and private-public partnerships.

Research: The relentless pursuit of excellence.

Appendix A

List of Projects Completed During 2003

Project #	Project Title
439	*Pasco Digitization*
482	*Evaluation of In-Service Highway Safety Features*
486	*Highway Facilities for an Aging Arizona Population*
499	*An Environmentally Sound Noise Reduction System*
509	*Hazardous Materials Inventory Status and Action Plan for ADOT*
511	*Best Project Management Practices for ADOT*
515	*Program and Project Financial Management Needs Assessment*
517	*Evaluation of Integrated Document Management System (IDMS) Options for ADOT*
526	*Coordination of Commercial Vehicle Data Collected by Automatic Traffic Counter (ATC) & Weigh-In-Motion (WIM)*
539	*Third Party Transaction Cost-Benefit Analysis*
542	*Congestion Management Strategies*
554	*Light Use Study for Vertical Channelization Devices*

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